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EXAMINER	
GE, YUZHEN	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/840,089	TIN, SIU-KEI	
	Examiner	Art Unit	
	YUZHEN GE	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-12,15-23 and 26-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-12,15-23 and 26-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/15/2006*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

Examiner's Remark

Applicant's amendment, filed on 2/3/2009 has been received and entered into the file. The 112 rejections have been overcome in view of applicant's amendments/remarks and are hereby withdrawn. Claims 1, 4-12, 15-23 and 26-33 are pending. The independent claims 1, 12 and 23 have been amended.

Regarding applicant's argument that Lin assumes that input device map 21 successfully transforms all input color values into valid color values in the CIE XYZ color space and in the present invention, no such assumption is made, the examiner would like to point out that the claim language of the claimed invention of the present application uses "comprising" which does not preclude additional elements disclosed by the reference of Lin.

Regarding applicant's argument that the device independent color values generated using the mathematical transformation are checked to determine if the device independent color values have luminance values less than zero and are clipped such that their luminance and chromaticity values are set to zero, the examiner would like to point out that two other references are used for the rejection. Furthermore, a pixel with negative luminance value does not correspond to a point in an image in the real world. A pixel with negative luminance can only happen because of error during mathematical manipulation. Hardeberg teaches the need to have luminance values and chromaticity components that correspond to real pixel values (col. 9, lines 1-31). Therefore it is obvious to one of the ordinary skill in the art, to set a negative luminance value and its corresponding chrominance values to 0, which is the closest valid pixel value of a pixel with negative luminance value to correct errors.

Regarding applicant's argument that Lin fails to acknowledge that the input device map may generate invalid color values, much less how to manage the invalid color values by setting luminance and chromaticity values to zero or by clipping an out of bounds color value to a boundary of a spectral locus as featured in the present invention, the examiner disagrees. First of all, the examiner has addressed the first part already in the previous paragraph, i.e., setting luminance and chromaticity values to zero. Secondly, Lin teaches clipping an out of bounds color value to a boundary of a spectral locus as featured in the present invention (Figs. 6A-6B, point 144 is clipped to 145, point 141 to 142, col. 15, lines 46-61). Furthermore clipping an out of bound color value to a boundary of a spectral locus is well known in the art. If the invention is just setting luminance and chromaticity values to zero for a pixel with negative luminance value, then the invention is also obvious as explicitly explained in the previous paragraph.

Regarding applicant's argument that setting the luminance value to zero when it is negative by Hardeberg is not the same as determining whether or not a transformed device-independent color value has a luminance component less than zero, the examiner would like to point out that a luminance value has to be determined to be negative in order to set it to zero. Therefore Hardeberg teaches the determining step. Furthermore the luminance value is a transformed device independent color value, since L*a*b* color space is a device independent color space and any color value expressed in L*a*b* are transformed from another device dependent color space as explained by Lin (col. 5, lines 29-32, col. 7, lines 18-36, a camera's color space is normally RGB). Therefore the luminance value that is negative and that is set to zero by Hardeberg is a transformed device-independent color value.

Regarding applicant's argument that Hardeberg, the starting pixel color values are all valid and in the present invention, only invalid color values resulting from a mathematical transformation from a device-dependent color space to a device-independent color space are identified and adjusted, the examiner would like to point out that when a color value is transformed from a device-dependent color space to a device--independent color space as in Lin et al, there may be color values that are erroneously computed, just like the color values in Hardeberg and Hardeberg teaches setting a luminance value to zero when the luminance value is negative. Whether the negative luminance value is from the conversion from device-dependent color space to device-independent color space or from other mathematical manipulation, it is still obvious that negative luminance value is set to 0 in view of Hardeberg.

Therefore the 103 rejection of claim 1 has not been overcome. Arguments on other claims depend on the argument of claim 1 and therefore the 103 rejections of the pending claims have not been overcome.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 4-12, 15-23, and 26-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1, 12 and 23 recite the limitation "the mathematical model". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 4-12, 15-23, and 26-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al (US Patent 6,181,445) in view of Hardeberg (US Patent 6,728,401) further in view of Spaulding et al (US Patent 5,539,540).

Regarding claim 1, Lin et al teach a method of transforming device-dependent color values in a device-dependent color space (RGB col. 9, lines 5-10) of a color input device to device-independent color values in a device-independent color space (XYZ or L*a*b*, col. 7, lines 25-36, col. 9, lines 5-10), comprising;

providing a mathematical transformation for converting device-dependent color values in a device-dependent color space of the color input device to device-independent color values in the device-independent color space (col. 7, lines 33-36, col. 9, lines 5-10)

converting an input device-dependent color value (RGB values col. 7, lines 25-36) in the device-dependent color space generated by the color input device into a device-independent color value (XYZ value, col. 7, lines 25-36 or L*a*b* value, col. 9, lines 5-10) in the device-independent color space (XYZ color space or CIE L*a*b* space, col. 7, lines 25-27 and lines 65-67) using **the mathematical model** of the color input device (col. 7, lines 19-36, the inverse

function convert from device dependent color values to a device-independent color value, col. 8, lines 4-21);

determining whether or not the device-independent color value is outside a spectral locus in the device-independent color space (Figs. 6A-6B, the gamut 133 is a spectral locus, see also Fig. 4, col. 9, lines 57-65, col. 15, lines 46-61); and

when it is determined that the device-independent color value is outside the spectral locus, clipping the device-independent color value to another device-independent color value in the device independent color space on the spectral locus (point 142 for point 141 and point 145 for point 144 in Fig. 6B, col. 11, lines 48-52, Figs. 6A-6B, point 144 is clipped to 145, point 141 to 142, col. 15, lines 46-61).

However they do not explicitly teach

determining whether or not a device-independent color value has a luminance component less than zero;

when it is determined that the luminance component is less than zero, performing the following:

clipping the luminance component to zero.

In the same field of endeavor, Hardeberg teaches

determining whether or not a device-independent color value has a luminance component less than zero (col. 9, lines 27-31);

when it is determined that the luminance component is less than zero, performing the following:

clipping the luminance component to zero (col. 9, lines 27-31).

Also in the same field of endeavor, Spaulding et al teach setting the chromaticity components of the device-independent color value to zero (Figs. 3, 6, 20, 22 and 24).

By the definition of luminance, it should be greater than or equal to 0. In other words, a valid value for the luminance value for a pixel of an image should be greater than 0. It may be small than 0 only when mathematical derivation and approximation are used. Also when the luminance component is 0, the chromaticity values are not meaningful. It is desirable to have the luminance values that correspond to real pixel values and correct any error made during mathematical manipulations and estimations (col. 9, lines 5-31 of Hardeberg). Therefore it would have been obvious to one of ordinary skill in the art, at the time of invention, to determine whether a luminance component is negative and clip the luminance component and chromaticity values to zero so that the color values are meaningful.

Regarding claim 4, Lin et al, Hardeberg and Spaulding teach the method according to claim 2. Lin et al further teach wherein the luminance component of the device-independent color value is not clipped at an upper bound in the clipping (col. 16, lines 8-31, the white point is specified by the threshold and the luminance is allowed to exceed the threshold value, Fig. 6B, point 141 to point 142, col. 15, lines 46-61, e.g. luminance levels from 0 to 40 are clipped to 30-40, while those from 40-100 are unchanged) wherein the luminance components of the device-independent color value is allowed to take a value higher than a diffuse white point of the device-independent color space (col. 16, lines 8-23, luminance values are allowed to be higher than 95, which is regarded as the diffuse white point).

Regarding claim 5, Lin et al, Hardeberg and Spaulding teach the method of claim 1. Lin et al further teach wherein the clipping the device-independent color value further comprises mapping the device independent color value outside the spectral locus to an intersection between a line defined by the device-independent color value and a white point and the boundary of the spectral locus (the point on L* axis is the white point, Fig. 6A, the point 135 is the result of mapping, 134 is the device-independent color value outside the spectral locus).

Regarding claim 6, Lin et al, Hardeberg and Spaulding teach the method of claim 2. The CIE spectral locus is a gamut on a chromaticity space. Therefore the same method taught by Lin et al, Hardeberg and Spaulding et al can be applied because the method of Lin et al does not constrain to any specific gamut. Lin et al also explicitly show the ISO standard CIE spectral locus on a chromaticity space as a gamut or a subspace of a color space (Fig. 4, col. 9, lines 57-65, the chromaticity of the visible spectrum shown by Lin et al is ISO standard CIE spectral locus, also the ISO standard CIE spectral locus is a well known gamut). It is desirable to reproduce color images (col. 1, lines 25-50 of Lin et al) and to broaden applications of the method taught by Lin et al to other gamut and it is desirable to have a system and method for color selection and color modification in the context of a uniform color model. Therefore it would have been obvious to one of ordinary skill in the art, at the time of invention, to apply the method of Lin et al to gamut whose boundary is the ISO standard CIE spectral locus on a chromaticity space to broaden the application of Lin et al and enable color selection and modification in a uniform color model.

Regarding claim 7, Lin et al, Hardeberg and Spaulding teach the method of claim 6. Lin et al further teach wherein the chromaticity space is the CIE chromaticity xy plane (col. 9, lines 57-65, Fig. 4).

Regarding claim 8, Lin et al, Hardeberg and Spaulding teach the method of claim 6. Lin et al teach using a perceptually linear chromaticity space (Figs. 5A, 6A and 7-8). Hardeberg further teaches to use a color space CIELUV (col. 6, lines 34-44) and it is well-known in the art that the coordinates of chromaticity space u'v' can be obtained from CIE LUV color space values. It is also well-known in the art that different perceptually linear chromaticity space such as the CIE uniform chromaticity scale (UCS) u'v' plane can be interchangeably used for other chromaticity space. Using a perceptually linear color space or perceptually linear chromaticity space is advantageous because it is uniform according to human visual system (col. 6, lines 31-39 of Hardeberg). Therefore it would have been obvious to one of ordinary skill in the art, at the time of invention, to use a CIE uniform chromaticity scale (UCS) u'v' plane so that the color space is perceptually uniform according to human visual system.

Regarding claim 9, Lin et al, Hardeberg and Spaulding teach the method of claim 1. Lin et al further teach wherein the device independent color space is CIE XYZ (col. 7, lines 25-36, Figs. 3A and 13A).

Regarding claim 10, Lin et al, Hardeberg and Spaulding teach the method of claim 1. Hardeberg further teaches wherein the device independent color space is CIELUV (col. 6, lines 34-44). Using a perceptually linear color space is advantageous because it is uniform according to human visual system (col. 6, lines 31-39 of Hardeberg). Therefore it would have been obvious to one of ordinary skill in the art, at the time of invention, to use a CIE LUV color space so that the color space is perceptually uniform according to human visual system.

Regarding claim 11, Lin et al and Hardeberg and Spaulding et al teach the method of claim 1. Lin et al further teach wherein the device independent color space is CIELAB (Figs. 3B, 5A-8, col. 10, lines 19-49, col. 11, lines 39-53).

Claims 12, 15-22 and 23, 26, 31-33 are the corresponding system and computer readable medium claims of claims 1, 4-11. All the limitations of computer readable medium claims 27-30 are in the corresponding method claims of claims 5-8. Lin et al teach a system (Figs. 1 and 12, col. 5, lines 17-28) and a computer readable medium (col. 6, lines 21-41, Fig. 12). Thus Lin et al and Hardeberg and Spaulding et al teach claims 12, 15-23 and 26-33 as evidently explained in the above-cited passages.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YUZHEN GE whose telephone number is (571)272-7636. The examiner can normally be reached on 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on 571-272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew C Bella/
Supervisory Patent Examiner, Art Unit 2624

Yuzhen Ge
Examiner
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